INVERTERS

The inverter is a basic component of PV systems and it converts DC power from the batteries or in the case of grid-tie, directly from the PV array into high voltage AC power as needed. Inverters of the past were inefficient and unreliable while today's generation of inverters are very efficient (85 to 96%) and reliable.

Today,the majority, if not all of the loads in a typical remote home operate at 120 VAC from the inverter. Most stand-alone inverters produce only 120 VAC,not 120/240 VAC as in the typical utility-connected home. The reason being,once electrical heating appliances are replaced with gas appliances, there is little need for 240 VAC power. Exceptions include good-sized submersible pumps and shop tools which can either be powered by a generator, step-up transformer, or possibly justify the cost of adding a second inverter. Most utility line-tie inverters produce 208,240 or 480VAC.

Two types of stand-alone inverters predominate the market – modified sine and sine wave inverters. Modified sine wave units are less expensive per watt of power and do a good job of operating all but the most delicate appliances. Sine wave units produce power which is almost identical to the utility grid, will operate any appliance within their power range,and cost more per watt of output.

Utility-tie systems / sine wave inverters for utility interactive photovoltaic applications,provide direct conversion of solar electric energy to utility power with or without a battery storage system. These systems are designed to meet or exceed utility power company requirements and can be paralleled for any power level requirement. They are listed to UL 1741 for photovoltaic power systems.

Inverter Component Checklist

While an inverter can account for a good portion of the cost of a PV system, it is really a sub-system that requires a number of additional components. To make a safe, reliable, code compliant installation one should provide the following:

Inverter to battery cabling

Because of the high current required on low voltage circuits, this cable is large, commonly #2 to 4/0 in size. Smaller conductors than required are unsafe and will not allow the inverter to perform to its full rating.

DC input disconnect and overcurrent protection

It is important to have safe installation with a properly sized DC rated, UL listed disconnect. Typically the disconnect works in conjunction with an overcurrent protection device such as a fuse or circuit breaker. These components are usually installed ini an enclosure which can also house shunts and additional equipment or circuit breakers.

Shunts

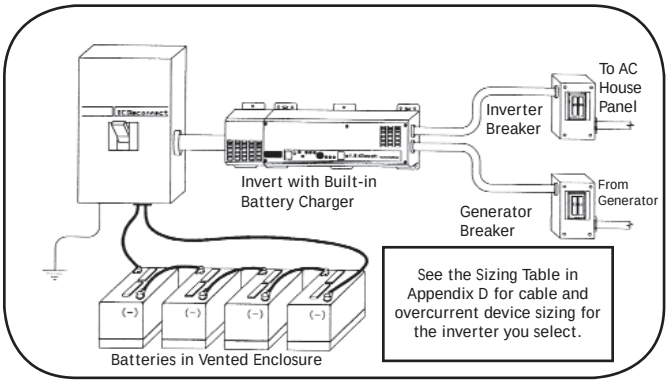
Used to read the amperage flowing between the battery and inverter, this device is installed in the negative conductor. It can easily be housed in the disconnect or its own enclosure.

AC output disconnect and overcurrent protection

If the breaker panel, which is fed from the inverter, is adjacent to the inverter, then the main breaker will serve as the inverter output disconnect and overcurrent protection. If, however, this panel is not grouped with the inverter, then a separate unit should be installed. This also holds true for AC circuits coming into the inverter from a generator or utility source. A second breaker may be needed if these breakers are not grouped.

Inverter Sub-System Checklist

_____ Inverter to battery cabling
_____ DC disconnect and overcurrent device
_____ Inverter conduit boxes
_____ Inverter output breaker box
_____ Generator input breaker box
_____ Shunt(s) if required for monitoring



Built-In Battery Chargers

Most larger inverters can operate as battery chargers as well. This is easily and economically accomplished because of the design of most inverters. Inverters step up low voltage DC power and change it to 120VAC power. Battery chargers do the reverse of this.

Transfer switches are also incorporated into these Inverter / Chargers so that the AC loads can be powered directly from the generator when the battery charger is operating.

From a reliability, performance, and economical standpoint, built-in battery chargers are the way to go.

Multi-Stage Battery Charging

A typical 12- volt lead-acid battery must be taken to approximately 14.2-14.6 VDC before it is fully charged. (For 24 volt systems double these figures for 48 volt, multiply by four.) If taken to a lesser voltage level, some of the sulfate deposits that form during discharge will remain on the battery's lead plates. Over time, these deposits will cause a 200 amp-hour battery to act more like a 100 amp-hour battery, and battery life will be shortened considerably. Once fully charged, batteries should be held at a lower float voltage to maintain their charge – typically 13.2 to 13.4 volts. Higher voltage levels will "gas" the battery and boil off electrolyte, requiring more frequent maintenance.

Most automotive battery charger designs cannot deal with the conflicting voltage requirements of the initial "bulk charge" and subsequent "float" or maintenance stage. These designs can accommodate only one charge voltage, and therefore must use a compromise setting – typically 13.8 volts. The result is a slow incomplete charge, sulfate deposit build-up, excessive gassing and reduced battery life.

The charger available in our inverters automatically cycles batteries through a proper three stage sequence (bulk, absorption and float) to assure a rapid and complete charge without excessive gassing.

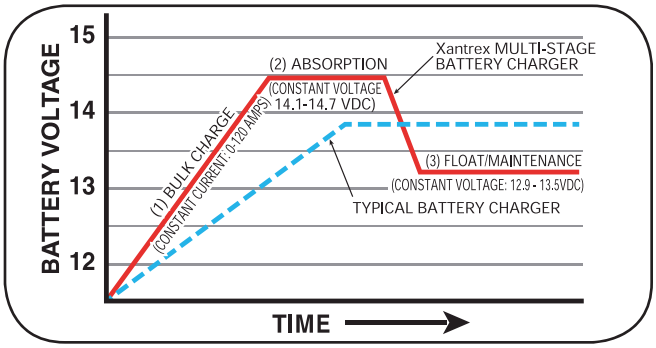
Factory battery charger settings on most inverter-charger combinations are optimal for a lead acid (liquid electrolyte) battery bank of 250-300 amp hours in a 70°F environment. If your installation varies from these conditions, you will obtain better performance from your batteries if you adjust the control settings.

The Maximum Charge Rate in amps should be set to 20-25% of the total amp-hour rating of a liquid electrolyte battery bank.

COMPARING INVERTERS

Inverters are compared by three factors:

- Continuous wattage rating. Hour after hour, what amount of power in watts can the inverter deliver.
- Surge Power. How much power and for how long can an inverter deliver the power needed to start motors and other loads.
- Efficiency. How efficient is the inverter at low, medium and high power draws. How much power is used at idle.



For example, a 400 amp-hour bank should be charged at no more than an 80 -100 amp rate. Excessive charge rates can damage batteries and create a safety hazard.

The Bulk Charge Voltage of typical liquid electrolyte lead acid batteries should be about 14.6 VDC. There is no one correct voltage for all types of batteries. Incorrect voltages will limit battery performance and useful life. Check the battery manufacturer's recommendations.

The Float Voltage setting should hold the batteries at a level high enough to maintain a full charge, but not so high as to cause excessive "gassing" which will "boil off" electrolyte. For a 12-volt liquid electrolyte battery at rest, a float voltage of 13.2- 13.4 is normally appropriate; gel cells are typically maintained between 13.5 and 13.8. If the batteries are being used while in the float stage, slightly higher settings may be required.

Charge voltage guidelines used here are based on ambient temperatures of 70°F. If your batteries are not in a 70°F environment, the guidelines are not valid. Temperature Compensation automatically adjusts the voltage settings to compensate for the differences between ambient temperature and the 70°F baseline. Temperature compensation is important for all battery types, but particularly gel cell, valve-regulated types which are more sensitive to temperature.

xantrex GT Utility Interactive Inverters

The GT Series is designed, built and priced to make the benefits of site generated power easy and affordable. Now anyone can install a solar array on their home or business to reduce or eliminate their monthly electric bill while doing their part to reduce air pollution. To take full advantage of this type of a system, net metering from your utility company would be a big plus as it allows you to turn your existing kilowatt-hour meter backwards when your PV system is producing more power than you are using. GT inverters incorporate all of the NEC and IEEE required AC and DC input/output and grounding connections as well as an AC/DC disconnect switch. Ground fault protection is included for installer convenience. With a NEMA 3R rated enclosure the inverter can even be mounted on an outside wall near your utility service entrance. Conduit box is removable. **Standard ten year warranty.**

GT Inverter

The GT's proprietary Maximum Power Point Tracking (MPPT) technology maximizes power extraction from a PV array of any type (single crystal, poly-crystalline or amorphous).

GT inverters come with a built-in backlit LCD display that shows system status and cumulative energy production 24 hours a day with just a knock. They also use the Xanbus Communications protocol, enabling them to communicate with other units connected in parallel within the system. From any inverter in the chain, you can read the system performance or that individual inverters performance.

The GT is listed to UL 1741-2005. It also meets IEEE 1547. Complies with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.

Product Name	GT2.8	GT3.3N	GT3.8	GT4.0N	GT5.0
Part Number	**705226**	**705227**	**706354**	**704135**	**704136**
Price	**$2,375.00**	**$2,875.00**	**$3,130.00**	**$3,130.00**	**$3,950.00**
Nominal output power	2.8 kVA	3.3 kVA	3.8 kVA	4.0 kVA	5.0 kVA
AC Voltage - Nominal	240 VAC/208 VAC	240 VAC/208 VAC	240 VAC/208 VAC	240 VAC/208 VAC	240 VAC/208 VAC
AC Voltage - Min/Max	211-264 (240) / 183-229 (208)				
MPPT Voltage range (CEC)	195-550 VDC	200-400 VDC	195-550 VDC	240-480 VDC	240-550 VDC
MPPT Operating range	193-550 VDC	200-550 VDC	195-550 VDC	235-550 VDC	235-550 VDC
Max. input current DC	15.4A (240) -14.9 (208)	17.5A (240) -16.5 (208)	20.8A (240) -19.5 (208)	17.0A (240) -17.0 (208)	22.0A (240) -20.0 (208)
Maximum array ISC	24 ADC				
Maximum Array VOC	600 VDC				
AC Output Characteristics	Current source				
Frequency - Nominal	60Hz				
Certifications	IEEE 1547 and UL 1741-2005				
CEC Efficiency (240 - 208)	94.0 - 93.5%	95.5 - 95.0%	95.0 - 95.0%	95.5 - 95.0%	95.5 - 95.0%
Max Inverter Efficiency	95.0 - 94.6%	95.9 - 95.6%	95.9 - 95.6%	96.0 - 95.7%	95.9 - 95.5%
AC Output Waveform	Sine wave				
THD	<3%				
Max. Cont. Output Current	11.7 - 13.0 A	13.8 - 14.9 A	15.8 - 16.8 A	16.7 - 18.3 A	21.0 - 22.0 A
Rated Temp. Range	-13° - 149°F (-25°C - +45°C)				
User Display: tap on the Xantrex logo to cycle through the screens.	Backlit alphanumeric LCD display - AC watts, kWh today, array voltage/current, and lifetime status messages, time on line, grid voltage and Hz.				
Enclosure Type	NEMA 3R, Rainproof				
Disconnect Switch	Integrated switch (disconnects both AC/DC & meets NEC 690)				
Inverter Dimensions	28.5" x 16" x 5.75" (724 mm x 403 mm x 145 mm)				
Inverter Weight	49.0 lbs (22.2 kg)		58.0 lbs (25.8 kg)		
Shipping Weight	57.0 lbs (25.9 kg)		65.0 lbs (27.2 kg)		

GT Inverter Accessories

Product Name and Description	Part Number	Price
GT Solar Inverter Monitor *Just plug in the Cat 5 cable and mount the monitor for full system information*	704133	$300.00

xantrex™ TR Series Modified Sine Wave Inverters

The TR Series of inverter/chargers are extremely versatile. They are designed for remote home power, utility back-up systems, and industrial applications. An automatic battery charger and transfer switch are standard, as are the easy to understand status and control function LEDs.

Both the 12 and 24 volt input TR Series inverters utilize the same enclosure, only the input voltage, output wattage and weight vary.

More Features

- 1500 to 3600 watts of continuous power.
- Digital display with a robust ON/OFF membrane switch
- Standard, built-in programmable battery charger.
- Series stackable for 240 VAC output (excluding 50hz).
- ETL certified to UL standards for residential use.
- Low power search mode.
- Automatic, fast transfer switching for standby.
- Overload and temperature protection power systems (SPS).
- Quiet, high-efficiency operation.
- Generator compatible.
- Two year warranty.

TR Series Inverter

Product Name and Description	TR1512-120-60	TR2412-120-60
Part Number	**706325**	**706327**
Price	**$950.00**	**$1145.00**
Nominal Input Voltage (Volts)	12VDC	12VDC
Continuous Power (Watts)	1500	2400
Surge Short Circuit (Amps Peak-10 sec)	50 +/-5	80 +/-8
Efficiency - Peak	>90%	>92%
Continuous Output (Amps AC)	12.5	20.0
Surge Overload (10 sec)	3000 VA	4800 VA
Search Mode Consumption	0.35 Amps	
DC Current @ Rated Power (Amps)	157.0	252.0
Input Voltage Range DC	11 - 15	
Output Voltage / Regulation	120VAC / +/- 5%	
Waveform	Modified sine wave	
Power Factor Allowed	0.8 to 1.0 (leading or lagging)	
Frequency	60Hz +/- 0.04%	
Adjustable Load Sensing	5 to 240W	
Series Stackable - 240VAC	Yes - Stacking cable included	
Automatic Transfer Relay	30A	
Maximum Charger Rate (Adjustable)	10-70A	14-100A
Three Stage Charging	Yes	
Temp. Comp. Probe	Yes - included	
Operating Ambient Temp	0 to 50°C	
Dimensions (in.) (H x W x D)	8.5 x 7.25 x 21.0	
Shipping Weight (lbs.)	50.0	52.0

Product Name	TR1524-120-60	TR2424-120-60	TR3624-120-60	TR1512-230-50	TR1524-230-50	TR2424-230-50
Part Number	**706326**	**706328**	**706329**	**706340**	**706341**	**706342**
Price	**$950.00**	**$1145.00**	**$1425.00**	**$1000.00**	**$1000.00**	**$1250.00**
Nominal Input Voltage (Volts)	24VDC	24VDC	24VDC	12.6VDC	25.2VDC	25.2VDC
Continuous Power (Watts)	1500	2400	3600	1500	1500	2400
Surge Short Circuit (Amps Peak-10 sec)	50.0 +/-5	80.0+/-8	120.0+/-12	26.5+/-2.5	26.5+/-2.5	42.0+/-4
Efficiency - Peak	>92%	>93%	>94%	>92%	>91%	>94%
Continuous Output (Amps AC)	12.5	20.0	30.0	6.5	6.5	10.4
Surge Overload (10 sec)	3000 VA	4800 VA	7200 VA	3000 VA	3000 VA	4800 VA
Search Mode Consumption	0.17 Amps		0.20 Amps	0.35 Amps	0.20 Amps	
DC Current @ Rated Power (Amps)	76.0	120.0	186.0	158.0	77.0	121.0
Input Voltage Range DC	22 - 30			11 - 15	22 - 30	
Transfer Time (typical)	<40ms (wide), <20ms (narrow)					
Waveform	Modified sine wave					
Power Factor Allowed	.8 to 1.0 (leading or lagging)					
Frequency	60Hz +/- 0.04%			50Hz / +/- 0.04%		
Adjustable Load Sensing	5 to 240 W					
Series Stackable - 240VAC	Yes - Stacking cable included			No		
Automatic Transfer Relay	30A			15A		
Maximum Charger Rate (Adjustable)	5-35A	10-70A	10-70A	10-70A	5-35A	10-70A
Three Stage Charging	Yes					
Temp. Comp. Probe	Yes - included					
Operating Ambient Temp	0 to 50°C					
Dimensions (in.) (H x W x D)	8.5 x 7.25 x 21.0					
Shipping Weight (lbs.)	50.0	55.0	55.0	52.0	52.0	52.0

TR Series Inverter Options

Product Name and Description	Part Number	Shipping Weight (lbs.)	Price
TR-Remote on/off Switch Remote battery temp. sensor with 15 ft. cable	706344	1.0	$150.00
TR-Conduit Box Conduit box - Can be used on the AC or DC side of inverter	706343	5.0	$250.00

xantrex™

GT Series Inverters

The Xantrex GT100 and GT250 incorporate an advanced Maximum Power Point Tracking (MPPT) algorithm to maximize the energy harvested from a PV array. To reduce power losses during the conversion process, the inverter uses the latest switching devices and a high-efficiency transformer to achieve a weighted CEC efficiency of 96%.

To ensure reliability, the Xantrex GT100 and GT250 and their sub-components are tested using Highly Accelerated Life Testing (HALT). HALT combines thermal and vibration technologies to stress a product beyond its specifications. This enables Xantrex to develop products and test them to a much higher standard than other inverter manufacturers. High reliability of the Xantrex GT100 and GT250 reduces system downtime and results in higher energy production.

Xantrex GT Series Grid Tie Solar Inverters are based on a reliable platform that is used in grid-connected photovoltaic (PV) and wind turbine applications throughout North America and Europe.

GT Series Inverter

Features

- Ultra-efficient design with industry-leading CEC efficiency of 96%, including isolation transformer
- Integrated design with transformer and AC/DC disconnects in one unit
- Night-time disconnect to reduce tare loss
- Integrated ground-fault detection and interruption
- Soft-start circuit to reduce nuisance trips
- Sealed design does not require filters or external air to cool sensitive components
- Back and sides of unit designed for zero clearance installations to minimize inverter space requirements
- Wiring access points on bottom, sides, back and top of inverter
- Removable air outlet allows inverter to be mated with venting ductwork
- Designed for forklift or sling transportation
- E-coated and powder coated steel enclosure for maximum corrosion resistance
- Designed for maximum reliability with film-type capacitors, bus bars in the power path, and uses compression lugs and disc springs to maintain torque
- Bright fluorescent green vacuum display with UV cover for ease of reading in sunlight
- RS485/Modbus and RS232 communications
- Available with either a five-year or ten-year warranty

Options:

- Fused sub-array combiner integrated in the inverter enclosure
- Positive-ground configuration
- Remote monitoring and control options using either Xantrex or third-party products
- Preventative maintenance programs

See next page for specifications and part numbers

Model	GT 100-208	GT100-480	GT250-480
Part Number	**705205**	**705206**	**705207**
Price	**$64,142.86**	**$61,285.71**	**$103,071.43**
Nominal Input Voltage (Volts)	208VAC	480VAC	480VAC
Continuous Power (Watts)	100 kW	100 kW	250 kW
Max. AC Line Current	309 A rms	137 A rms	342 A rms
Power Factor	> 0.99		
Efficiency - CEC rating	96.0%		
Max. DC Input Current	347 ADC	347 ADC	867 ADC
DC Input Voltage Range	300 - 600 VDC		
PowerTracking Window Range	300 - 600 VDC		
Frequency	60Hz (+0.5Hz / -3.0Hz)		
Ambient Temperature	-5F to 122F (-15C to 50C)		
Enclosure Rating	NEMA 3R (outdoor rating)		
Dimensions (HxWxD)	73.3" x 67.0" x 46.1" (1862 x 1702 x 1171mm)		86.3x90.0x46.1 (2192x2286x1171)
Shipping Weight	3000 lb (1361 kg)	3000 lb (1361 kg)	4000 lb (1814)

MORNINGSTAR corporation

Morningstar Inverters

Model	SureSine-115V-UL	SureSine-115V	SureSine-220V
Part Number	**706331**	**703077**	**703072**
Price	**$310.00**	**$299.00**	**$308.00**
Nominal Input Voltage (Volts)	12VDC		
Continuous Power (Watts)	300		
Surge Power (10 minutes)	600		
Efficiency - Peak	92%		
Total Harmonic Distortion (THD)	<4%		
Self Consumption	450mA (on, no load) 25mA (off) 55mA (stand-by)		
Standby Threshold	~ 8 watts		
Low Voltage Disconnect (user selectable)	11.5v or 10.5v		
Low Voltage Reconnect (user selectable)	12.6v or 11.6v		
LVD Delay Period	4 minutes		
Input Voltage Range DC	10.0 - 15.5		
High Voltage Disconnect	15.5v		
High Voltage Reconnect	14.5v		
High Temperature Disconnect	95°C (heatsink)		
High Temperature Reconnect	80°C (heatsink)		
AC Wire Terminals	12AWG max		
DC Wire Terminals	14 - 2 AWG		
Remote On/Off Terminals	24 - 16 AWG		
Output Voltage / Regulation	120VAC / +/- 10%	120VAC / +/- 10%	220VAC / +/- 10%
Frequency	60Hz +/- 0.01%	60Hz +/- 0.01%	50Hz +/- 0.01%
Enclosure	IP20 Cast Anodized Aluminum		
Operating Ambient Temp	-40 to +45°C		
Dimensions (H x W x D)	8.4 x 6.0 x 4.1 in - 213 x 152 x 105 mm		
Shipping Weight (lbs.)	10.0 lbs - 4.5 kg		

* 300 Watt Pure Sine Wave Inverter
* Up to 600 Watt Surge Capability
* High Efficiency and Low Self-consumption
* No Internal Cooling Fan
* Reverse Polarity Fused
* AC Short Circuit Protected
* AC Overload Protected
* High Voltage Disconnect
* Low Battery Disconnect
* High Temperature Disconnect
* Two Year Warranty
* Epoxy Encapsulated Transformer & Inductors
* Conformal Coated Circuit Boards

FX Series

The OutBack FX Inverter is a modular "building" block sine wave inverter/charger which can be used for both small and large power systems. Each OutBack FX inverter / charger module is a complete power conversion system - DC to AC inverter, battery charger and AC transfer switch. Additional inverter / chargers can be connected at anytime in either parallel (120 VAC), series (120/240 VAC), or even three-phase (120Y208 VAC) configurations, allowing the system to be tailored to the specific power conversion requirements of the application, both at the time of the installation and in the future. The FX Series is also available in export versions. Up to eight FX inverter / chargers can be connected together to provide up to 24 kW of continuous power conversion capacity. The OutBack FX inverter / charger system is designed for both residential and commercial stand-alone and utility-interactive applications with battery energy storage. 2 year warranty.

FX Series Inverter
Shown with optional FX-ACA& FX-DCA

More Features

- Powdercoated all aluminum die-cast chassis
- Internal electronic components are cooled by heat transfer
- Gaskets on all openings to provide water-resistance
- Sealed design protects internal electronics from salt, dirt or contaminated air, bugs, critters, mold etc.
- Conformal coated circuit boards to resist corrosion
- Designed to allow easy field servicing and repair

Applications

- Hot and humid climates where a protected area is not available for installation of the inverter/charger system
- Salt air environments such as Hawaii where you can't get away from the salt air and where there is little difference between indoors and outdoors
- Dirty environments where dust or drifting organic matter such as cottonwood could clog an air openings in an unattended system
- Boats and RV's where water might splash on the inverter
- Greater control of unwanted radio frequency interference

Product Name	FX2524T	FX2012T	FX3048T
Part Number	**704310**	**705474**	**704311**
Price	**$2369.00**	**$2369.00**	**$22369.00**
Continuous Output Power	2500 VA	2000 VA	3000 VA
Continuous Output Current at 25^{o}	20.8 amps AC RMS	17 amps AC RMS	25 amps AC RMS
Idle Power (120 VAC Output No Load)	20W DC		23W DC
Output Voltage	120 VAC / 60Hz		
DC Input Voltage (Nominal)	24 VDC	12 VDC	48 VDC
Efficiency - Typical	92%	90%	93%
Output Voltage Regulation	+/- 2% typical		
Continuous DC Charge Rate	55 Amps DC	80 Amps DC	35 Amps DC
Frequency Range	54-66Hz		
DC Input Voltage Range	21 - 34 VDC	10 - 16 VDC	42-68 VDC
Min. Recommended DC Breaker	OBDC-175	OBDC-250	OBDC-100
Dimensions (in.) (H x W x L)	13 x 8.25 x 16.25 (Shipping: 21.75 x 13 x 22)		
Shipping Weight (lbs.)	67.0	67.0	67.0

Product Name	FX2012ET	FX2024ET	FX2348ET
Part Number	**705477**	**705478**	**705479**
Price	**$2469.00**	**$2469.00**	**$2469.00**
Continuous Output Power	2000 VA	2000 VA	2300 VA
Continuous Output Current at 25o	8.7 amps AC RMS	8.7 amps AC RMS	10 amps AC RMS
Idle Power (120 VAC Output No Load)	20 W DC	20 W DC	23 W DC
Output Voltage	230 VAC / 50 Hz		
DC Input Voltage (Nominal)	12 VDC	24 VDC	48 VDC
Efficiency - Typical	90%	92%	93%
Output Voltage Regulation	+/- 2% typical		
Continuous DC Charge Rate	100 Amps DC	55 Amps DC	35 Amps DC
Frequency Range	44-56 Hz		
DC Input Voltage Range	10.5-17 VDC	21-34 VDC	42-68 VDC
Min. Recommended DC Breaker	OBDC-250	OBDC-175	OBDC-100
Dimensions (in.) (H x W x L)	13 x 8.25 x 16.25		
Shipping Weight (lbs.)	67.0	67.0	67.0

GTFX Series

OutBack grid-tie inverters feature Battery back-up with close-to batteryless inverter system performance. 2 year warranty-5 yr. optional

Features

- UPS grade AC transfer switch system
- Built-in automatic “silent” sell mode
- More tolerant of partially shaded PV arrays
- Easy system expansion and flexible design
- Single, split or three phase AC output
- Long battery life through intelligent control of charging process
- MATE display can be placed indoors with RS 232 PC connection
- 24 or 48 VDC battery banks
- ETL Listed
- Export versions are available

GTFX Series

Product Name	GTFX2524 Sealed	GTFX3048 Sealed	GVFX3524 Vented	GVFX3648 Vented
Part Number	**705461**	**705462**	**704298**	**704299**
Price	**$2369.00**	**$2369.00**	**$2569.00**	**$2569.00**
Continuous Output Power	2500 VA	3000 VA	3500 VA	3600 VA
Continuous Output Current at 25o	21 Amps AC RMS	25 Amps AC RMS	29 Amps AC RMS	30 Amps AC RMS
Idle Power (120 VAC Output No Load)	18-20 W DC	21-23 W DC	18-20 W DC	21-23 W DC
Output Voltage	120 VAC / 60 Hz			
DC Input Voltage (Nominal)	24 VDC	48 VDC	24 VDC	48 VDC
Efficiency - Peak	92%	93%	92%	93%
Output Voltage Regulation	+/- 2% typical			
Continuous DC Charge Rate	55 Amps DC	35 Amps DC	85 Amps DC	45 Amps DC
Frequency Range	Grid-tie mode +/- 5 Hz / Line-tie mode +/- 2.0 Hz			
DC Input Voltage Range	20-33 VDC	40-66 VDC	20-33 VDC	40-66 VDC
Min. Recommended DC Breaker	OBDC-175	OBDC-100	OBDC-250	OBDC-175
Dimensions (in.) (H x W x L)	13 x 8.25 x 16.25		12 x 8.25 x 16.25	
Shipping Weight (lbs.)	67.0	67.0	62.2	62.2

VFX Series

Now you can choose from sealed or vented OutBack inverter/chargers depending on the environment of your installation. Up to eight VFX inverters can be connected together to provide up to 28,800 watts of continuous power conversion capacity. Standard 2 year warranty, optional 5 year.

VFX Series

More Features

- Powdercoated all aluminum die-cast chassis
- Internal electronic components are cooled by outside air
- Stainless steel screen to protect air intake and internal fan
- UL 94V0 plastic vent grills to protect the air exhaust. All openings are 0.0025 inches square to keep out dirt, bugs, and other critters.
- Air inlet comes with removable,washable foam filter insert to trap small particles
- Conformal coated circuit boards to resist corrosion
- Higher output power when inverting or battery charging when compared with the sealed FX inverter versions
- Designed to allow easy field servicing and repair

Applications

- Montana or Arizona etc. where salt air is not a problem and climate is dry
- More watts per dollar
- Installations where well protected environments are available

Product Name	VFX2812	VFX3524	VFX3648
Part Number	**704293**	**704292**	**704291**
Price	**$2569.00**	**$22569.00**	**$2569.00**
Continuous Output Power	2800 VA	3500 VA	3600 VA
Continuous Output Current at 25o	23.3 amps AC RMS	29.2 amps AC RMS	30.0 amps AC RMS
Idle Power (120 VAC Output No Load)	19-21 W DC	18-20 W DC	21-23 W DC
Output Voltage	120 VAC / 60 Hz		
DC Input Voltage (Nominal)	12 VDC	24 VDC	48 VDC
Efficiency - Peak	> 90%	92%	93%
Output Voltage Regulation	+/- 2% typical		
Continuous DC Charge Rate	125 amps DC	85 amps DC	45 amps DC
Frequency Range	50-70 Hz		
DC Input Voltage Range	10-16 VDC	20-33 VDC	40-66 VDC
Min. Recommended DC Breaker	OBDC-250	OBDC-250	OBDC-175
Dimensions (in.) (H x W x L)	12 x 8.25 x 16.25		
Shipping Weight (lbs.)	62.2		

Product Name	VFX2612E	VFX3024E	VFX3048E
Part Number	**705471**	**705476**	**705475**
Price	**$2679.00**	**$2679.00**	**$2679.00**
Continuous Output Power	2600 VA	3000 VA	3000 VA
Continuous Output Current at 25o	11.3 amps AC RMS	13.0 amps AC RMS	13.0 amps AC RMS
Idle Power (120 VAC Output No Load)	19 - 21 W DC	18 - 20 W DC	21 - 23 W DC
Output Voltage	230 VAC / 50Hz		
DC Input Voltage (Nominal)	12 VDC	24 VDC	48 VDC
Efficiency - Peak	> 90%		
Output Voltage Regulation	+/- 2% typical		
Continuous DC Charge Rate	100 amps DC	85 amps DC	45 amps DC
Frequency Range	40-60 Hz		
DC Input Voltage Range	10 - 16 VDC	20 - 33 VDC	40 - 66 VDC
Min. Recommended DC Breaker	OBDC-250	OBDC-250	OBDC-175
Dimensions (in.) (H x W x L)	12 x 8.25 x 16.25		
Shipping Weight (lbs.)	62.2		

Mobile Series

Both FX and VFX inverter/chargers are available to be used in RV, marine, truck, and other mobile applications. OutBack Mobile Series supplies smooth, true sine wave AC output power. They are built to survive dust, bugs, even rain and salt air. Choice of sealed FX or bug-proof VFX versions. Installation of the inverter in an RV is now less of a problem. Standard 2 year warranty-optional 5 year.

More Features

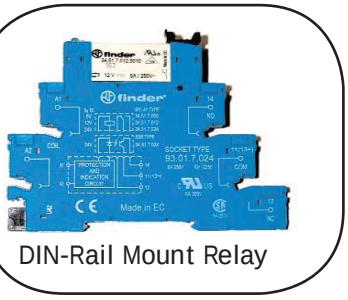
- Ultra clean AC power
- Extremely rugged
- Extremely efficient
- Intelligent battery charger
- Very quiet
- Easy system expansion
- Serviceable
- Defeatable neutral to GND switching
- Capable tech support help
- Coolness factor

Product Name	FX2532MT	FX2524MT	FX2012MT
Part Number	**705481**	**705482**	**705472**
Price	**$2369.00**	**$2369.00**	**$2369.00**
Continuous Output Power	2500 VA	2500 VA	2000 VA
Continuous Output Current at 25o	20.8 amps AC RMS	20.8 amps AC RMS	17 amps AC RMS
Idle Power (120 VAC Output No Load)	~21 W DC	~20 W DC	~20 W DC
Output Voltage	120 VAC / 60Hz		
DC Input Voltage (Nominal)	32 VDC	24 VDC	12 VDC
Efficiency - typical	92%	92%	90%
Output Voltage Regulation	+/- 2% typical		
Continuous DC Charge Rate	35 amps DC	55 amps DC	80 amps DC
Frequency Range	54-66 Hz		
DC Input Voltage Range	28-45.3 VDC	21-34 VDC	10.5-17 VDC
Min. Recommended DC Breaker	OBDC-125	OBDC-175	OBDC-250
Dimensions (in.) (H x W x L)	13 x 8.25 x 16.25		
Shipping Weight (lbs.)	67.0		

Product Name	VFX3524M	VFX2812M
Part Number	**705473**	**704296**
Price	**$2569.00**	**$2569.00**
Continuous Output Power	3500 VA	2800 VA
Continuous Output Current at 25o	29.2 amps AC RMS	23.3 amps AC RMS
Idle Power (120 VAC Output No Load)	~20 W DC	~20 W DC
Output Voltage	120 VAC / 60Hz	
DC Input Voltage (Nominal)	24 VDC	12 VDC
Efficiency - typical	92%	90%
Output Voltage Regulation	+/- 2% typical	
Continuous DC Charge Rate	85 amps DC	125 amps DC
Frequency Range	50 - 70 Hz	
DC Input Voltage Range	21.34 VDC	10.5 - 17 VDC
Min. Recommended DC Breaker	OBDC-250	OBDC-250
Dimensions (in.) (H x W x L)	12 x 8.25 x 16.25	
Shipping Weight (lbs.)	62.2	

OutBack FX Series Inverter Options

Product Name and Description	Part Number	Price
DCA Aluminum conduit adapter required when mounting a FX inverter to any OutBack DC enclosure or to a 2" conduit.	704269	$45.00
FW-ACA -AC wiring compartment extension and 2" conduit adapter. Also needed to connect an FX inverter to an OutBack AC enclosure.	704270	$45.00
FW-SP-ACA Surge Protector, fits in the FW-ACA for FW-500 & 1000 systems. 120-240VAC/12-48VDC operating range.	705485	$259.00
FW-SP-250 Surge Protector, fits inside FW-250 AC side. Specs are the same as above.	705486	$259.00
FW-SP-R Surge Protector replacement board.	703487	$209.00
RTS -Outback Remote Temperature Sensor w/ 20' cable	704275	$29.00
DIN-Rail Mount Relay - Use to control up to a 6A/250V~ circuit such as an aux fan or generator start from the aux output on the FX.	704308	$45.00



DIN-Rail Mount Relay


RTS

OutBack System Management Remote Monitor and Control

The OutBack MATE and MATE2 are complete system controllers and displays for the OutBack FX inverter/charger. They provide a display of operations as well as allow for control and adjustment of the product se points. The OutBack MATEs also coordinate the operation of the entire inverter/charger system to maximize performance and to prevent multiple products from conflicting.

Through the use of an OutBack HUB communications manager, a single OutBack MATE, MATE2 or MATE2M is able to connect to multiple FX inverter/chargers and other OutBack products. A maximum of ten OutBack products will be able to be connected to a single MATE via a HUB using CAT 5 type Ethernet cabling with 8 wire RF45 modular connectors.

Product Name and Description	Part Number	Price
MATE (White) -Shipped with 50ft CAT 5 interconnect cable with RS232 port	704272	$295.00
MATE_B (Black) -Shipped with 50ft CAT 5 interconnect cable with RS232 port	704302	$295.00
MATE2 -Flush mount Mate for wall mounting. Same as standard MATE, except flush mount. with RS232 port	704305	$295.00
MATE2M - Reduced menu (non-grid-tie) for use in RV's and boats. Without RS232 port	704306	$219.00
HUB-4 Communications **Manager** -Allows the MATE to control up to four FX2000 inverters / chargers and MX60 MPPT charge controllers.	704273	$195.00
HUB-10 Communications **Manager** -Allows the MATE to control up to ten FX2000 and MX60.	704276	$375.00
FN-DC FLEXnet DC -Advanced DC System Monitor.	707388	$379.00

MATE


MATE2

Sunny Boy 3000US/4000US

SMA is proud to introduce our new line of inverters updated with our latest technology and designed specifically to meet the new IEEE 1547 requirements. Compact design makes them ideal for residential use and the integrated DC disconnect makes installation more cost effective. They are field-configurable for positive ground systems making them more versatile than ever. Increased efficiency means better performance and shorter payback periods. With over 500,000 fielded units, Sunny Boy has become the benchmark for PV inverter performance and reliability throughout the world.

Sunny Boy
3000US/4000US

Features:

- Certified to the new UL1741/IEEE 1547
- 10 year standard warranty
- Improved CEC efficiency
- Integrated load-break rated DC disconnect switch
- Integrated fused series string combiner
- Sealed electronics enclosure & Opticool
- Comprehensive SMA communications and data collection options
- Ideal for residential or light commercial applications
- Rugged cast aluminum outdoor rated enclosure

Model	SB 3000US	SB4000US
Part Number	704195	704191
AC Input Voltage	208, 240 VAC	
Max AC Output Power	3000 W	4000 W
Max DC Voltage	500 VDC	600 VDC
Max DC Current	17 A	18 A
CEC Efficiency	95.0%@208 - 95.5%@240	95.5%@208 - 96.0%@240
MPPT Voltage (DC)	180-400@208 / 200-400@240	220-480@208 / 250-480@240
Cooling	Forced, convection	
Dimensions (cm)(WxHxD)	45.2 x 35.0 x 23.6	
Shipping Weight (lbs.)	94	94

Sunny Boy Invert Accessories

The SMA Sunny Boy inverter is UL 1741 listed and available in North America. Sunny Boy's extensive track record in some of the world's most demanding markets has made it a favorite among PV professionals everywhere. SMA's state of the art maximum power point tracking performance results in excellent real-world energy capture. Sunny Boy's safety and reliability record is also exceptional due to the inverter's redundant grid monitoring and built-in ground fault detection and interruption protection. The inverter's IGBT power stage generates a nearly perfect sine wave with the lowest harmonic distortion in the industry and meets new ultra-strict FCC EMC standards. SMA's unique string inverter technology makes future system expansion simple. Sunny Boy's optional communication capability allows for extensive data acquisition from one or many inverters. 5 year warranty standard. 5 year warranty extension available for extra cost. Call for details.

Sunny Boy 700U Inverter

Model	700U SBD with LCD
Part Number	**706192**
AC Input Voltage	120 VAC (106-132)
Max AC Power Output (Watts)	700/600/460 (Jumper adj.)
Max DC Voltage	250 VDC
Max DC Input Current	7.0 A
Total Harmonic Distortion	THD < 3%
Peak Efficiency	93.6/93.3/92.4%
Output Frequency	60 Hz (59.3-60.5)
Max. Peak Power Tracking Voltage	250/200/150 VDC
Min. Peak Power Tracking Voltage	123/100/77 VDC
Cooling	Convection Cooling (No fan)
Dimensions (in.) (L x W x D)	12.7 x 12.6 x 7.09
Weight (lbs.)	42.87

Product Name and Description	Part Number
RS232-N Module Communication option for directly linking one inverter directly to your computer or control	704209
RS485-N Module	704210
RS485 Cable, 15 meter, shielded	704213
DC Disconnect Fuseless Disconnect for Sunny Boy inverters.	703961

Sunny Boy 5000US/6000US/7000US

The Sunny Boy 5-7000US is SMA's latest addition to the Sunny Boy family of utility interactive inverters. It features their new cast-aluminum enclosure which together with the Opticool cooling design make the SB6000US/7000US a great performer. The SB 5-7000US is designed for use with PV, fuel cell, wind-turbine and micro-turbine technologies. the SB 5-7000US follows SMA's modular system design philosophy for utility, commercial and residential PV installations from 5kW and up. Automatic sensing of the site utility voltage makes installation on almost any utility system trouble-free. Just wire the inverter into an 208, 277 or 240 VAC system, make one internal jumper setting and the SB 5-7000US does the rest. Our proven peak-power-point tracker results in maximum energy capture. The SB 5-7000US uses the same SMA communication accessories as every other inverter in the Sunny Boy family. Choose the system package that best suits your needs. SMA offers a variety of hardware and software solutions from low cost wireless system monitoring, to complex data acquisition systems that integrate large numbers of inverters with external sensors to networked PC's and the internet. All include DC disconnect. 10 year warranty.

Model	Sunny Boy 5000US	Sunny Boy 6000US	Sunny Boy 7000US
Part Number	704186	704202	704190
AC Output Voltage	208, 277, 240 VAC		
AC Output Frequency	59.3 - 60.5 (60Hz)		
Max. DC Input Voltage	600 VDC		
Max AC Output Power	5000 (at 277 or 240 VAC)	6000 (at 277 or 240 VAC)	7000 (at 277 or 240 VAC)
Current THD	THD < 4%		
Efficiency - Peak	96.8%	> 97%	> 97.1%
Max DC Current	21 ADC	25 ADC	30 ADC
DC Voltage Ripple	< 5%		
MPPT Voltage	250-480 VDC		
Enclosure	NEMA 3R		
Power Consumption	<7 W (standby), 0.25 W (nighttime)		
Ambient Temperature	-25°C - +45°C		
Cooling	Temperature regulated fan cooling		
Dimensions (icm) (W x H x D)	184 x 241 x 95		
Weight (lbs.)	143.0		

Sunny Boy 5-7000US

Sunny Tower

SMAbrings you the best in commercial inverter solutions: The Sunny Tower. Designed with the installer in mind; we've combined ease of installation, the lowest specific cost ($/Watt), and the highest efficiency to maximize rebates and power production while minimizing your payback period. The Sunny Tower combines all the advantages of string inverters with the installation advantages of central inverters. The Sunny Tower offers you the flexibility and the reliability you've come to expect from SMA. 10 year warranty.

Model	Sunny Tower 42	Sunny Tower 42 w/web box	Sunny Tower 36	Sunny Tower 36 w/web box
Part Number	**704192**	**704187**	**704194**	**704193**
AC Max. Output Power	42 kW		36 kW	
AC Output Voltage	208, 240, 277 nomimal			
DC Input Voltage Range	250 - 600 VDC			
MPPT Voltage	250 - 480 VDC			
DC Max. Current	6 x 30 A			
Enclosure	NEMA 3R			
Efficiency-CEC	95.5%			
Ambient Temperature	-13°F - +113°F			
Operating Temp. Range	-13°F - +149°F			
Cooling	Temperature regulated fan cooling			
Shipping Weight (lbs.)	1,700			

Sunny Tower 6

Sunny WebBox

The Sunny WebBox from SMAis a powerful communications tool that allows the operating data of your solar system to be logged and easily transmitted via modem or Ethernet to the Web or directly to your PC. It can also send the data to SMA's new internet portal (Sunny Portal) which provides free long-term data storage and graphical display of your system data. Collected information is stored in comman file formates so that you can use it in various spread-sheets, graphs or your own web site. The Sunny WebBox is extremely versatile; making thestorage, transmission, management and display of your system data easier than ever before. 5 year warrany.

Product Name and Description	Part Number
Sunny WebBox The Sunny WebBox features: System access from any Web browser - anywhere in the world. Recording of daily, monthly and annual energy yield via Sunny Portal. Remote plant diagnosis and system configuration. Automatic data transfer at chosen intervals. Data storage and display via Ethernet. Compatible with all SMA utility interactive inverters.	705453

Sunny WebBox

Sunny Island

The Sunny Island 4248U and 5048U battery based inverters are simple to install and use, yet loaded with powerful and advanced features. The Sunny Island 4248U and 5048U are designed to meet the needs of off-grid as well as back-up power system applications. These inverters will not grid-tie. They feature: integrated DC breaker, near silent operation, non-volatile memory, compatible with all Sunny Controls, sealed electronics compartment, generator overload protection and generator reactive power compensation. Two units can be "stacked" for 240 VAC output.

The Sunny Island 4248U & 5048U also help to optimize the overall life of the batteries through their advanced battery management system. The Sunny Island can also be utilized as a back-up system in grid-tied applications. Seamless transfer allows existing Sunny Boy inverters to be utilized during daytime grid outages. The Sunny Island is an extremely robust and sophisticated unit providing both off-grid and backup users with the highest quality available in the industry today.

Sunny Island 4248U

Model	Sunny Island 4248U	Sunny Island 5048U
Part Number	704323	707620
AC Output Voltage	120 VAC	120 VAC
AC Output Frequency	60Hz	60Hz
DC Input Voltage	48 VDC	48 VDC
AC Output Power (25 C)	4200 Watts (3400@45 C)	5000 Watts (4000@45 C)
Current THD	THD < 3%	THD < 3%
Enclosure	NEMA 1	NEMA 1
Power Consumption	<4 W (standby),<22 W No load	<4 W (standby),<25 W No load
Ambient Temperature	-20°C - +45oC	-20°C - +45°C
Cooling	Temperature regulated fan cooling	Temperature regulated fan cooling
Dimensions (in.) (L x W x D)	23.23 x 15.35 x 9.65	24.1 x 18.4 x 9.3
Weight (lbs.)	86.0	139.0

* Certified to the new UL 1741 / UL 1998 standards
* 5-year warranty
* Suitable for systems from 3 kW to 26 kW
* AC coupling of all energy sources
* DC coupling with optional equipment
* 1, 3 and split-phase, connectable in parallel
* Excellent overload characteristics for motor starting
* Long battery service life due to optimum battery management system
* Memory card